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10/804,714	03/19/2004	Carlos Abad	126888-1	7505
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CANTOR COLBURN LLP			BOYKIN, TERRESSA M	
55 GRIFFIN RD SOUTH			ART UNIT	
BLOOMFIELD, CT 06002			PAPER NUMBER	

1711

DATE MAILED: 02/02/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/804,714

Applicant(s)

ABAD ET AL

Examiner

Terressa M. Boykin

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 10 January 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-27 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-27 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

Response to Amendment

1. Applicant's arguments filed 1-10-05 have been fully considered but they are not deemed to be persuasive.

Arguments Not Persuasive with regard to the previous 112 rejection:

Applicants' arguments regarding the 112 rejections have been considered but are not persuasive. As written, applicants' claims do not make clear whether components may simultaneously not be present, i.e. each of the components equals zero. It is noted that applicants' assert that the amount of ionic species may "begin at zero" and would thus not be present and thus not a necessary limitation for anticipation.

35 USC 112, Second Paragraph

Claim 1 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

With regard to applicants recited "ionic species in an amount of zero." It is unclear whether the recited ionic species is in fact present or whether applicant's language is directed to the combination thereof.

Arguments Not Persuasive with regard to the previous 102 rejection as well as the 103 rejection:

Applicants' arguments regarding the 102 rejection with respect to the

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presence of each and every element of the claim is mute since no such determination has been established in view of the above 112 rejection, i.e. if the ionic species may each be simultaneously zero, then no such limitation of the claims is required to anticipate such.

With regard to the aromatic dihydroxy compound of claim 9 etc., the reference Discloses, throughout, that the polycarbonate block of the poly(carbonate-co-ester) copolymer is derived from a polycarbonate reaction mixture comprising an aromatic *dihydroxy* compound and a carbonic acid diester, such as *bisphenol A* and diphenyl carbonate, respectively.

Consequently, the claimed invention continues to not be deemed as novel and accordingly is unpatentable.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1- 27 are rejected under 35 U.S.C. 102(b) as being anticipated by US

6486294 see abstract, cols. 1-6, examples 1-6, tables 4 and claims 1-29, 40-4961-70.

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Applicants' claim a polycarbonate composition comprising a chloride, sulfate, phosphate or a combination of two or more of the foregoing ionic species in an amount of zero to about 100 parts per billion based on the total weight of the polycarbonate.

US 6486294 discloses a poly(carbonate-co-ester) block copolymer is synthesized using synthetic strategies that can be incorporated into conventional melt facilities that are commonly used in the production of polycarbonate polymers. The polycarbonate block of the poly(carbonate-co-ester) copolymer is derived from a polycarbonate reaction mixture in methylene chloride comprising an aromatic dihydroxy compound and a carbonic acid diester, such as bisphenol A and diphenyl carbonate, respectively.

With regard to claims 1 and 2 note that reference discloses the presence of a phenol, carbonic diester aromatic dihydroxy compounds or combinations of two or more thereof, note that the reference discloses the use of the diarylesters prepared according to the method outlined in section I of the specification in a melt polymerization process in which dihydric phenol and a diester of carbonic acid are reacted along with the diarylester, which is incorporated into the backbone of the polymer.

With regard to the weight average molecular weight as claimed, note that the reference discloses that It is desirable for the poly(carbonate-co-ester) to have a molecular weight of 10,000 to 100,000 g/mol as measured by GPC and relative to polystyrene standards, preferred is 20,000 to 80,000 g/mol, and most preferred is 25,000 to 60,000. The molecular weight M_w was determined to be 5.10×10^4 g/mol via gel permeation chromatography (GPC) using a 1 mg/ml polymer solution in methylene chloride versus polystyrene standards. Thus, in view of the above, the disclosed molecular weight overlaps the claimed range of 40,000 to about 90,000 dalton.

Optionally, after the transesterification of the diaryl carbonate and the dicarboxylic

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acid, the reaction product may be further purified to remove residual diaryl carbonate and acid. In one embodiment, the reaction product is dissolved in from about 1 to about 3 weight equivalents of an organic solvent. Suitable organic solvents include, but are not limited to methanol; and a methanol/methylene chloride solution. Note that the methylene chloride solution would impart ionic species to the mixture from zero to about 100 parts per billion based on the total weight of the polycarbonate. However, it is noted that the ionic species in an amount of zero is inclusive of the ionic species not being present.

The reference also relates to the use of the diarylesters prepared according to the method outlined in section I of the specification in a melt polymerization process in which dihydric phenol and a diester of carbonic acid are reacted along with the diarylester, which is incorporated into the backbone of the polymer. Residues of dihydric phenols which are useful in preparing the polyester carbonate. Suitable dihydric phenols of the reference include, but are not limited to, BPA; 2,2-bis(3,5-dibromo-4-hydroxyphenyl)propane; 2,2-bis(3,5-dimethyl-4-hydroxyphenyl)propane; 1,1-bis(4-hydroxyphenyl)cyclohexane; 1,1-bis(3,5-dimethyl-4-hydroxyphenyl)cyclohexane; 1,1-bis(4-hydroxyphenyl)decane; 1,1-bis(4-hydroxyphenyl)propane; 1,1-bis(4-hydroxyphenyl)cyclodecane; 1,1-bis(3,5-dimethyl-4-hydroxyphenyl)cyclododecane; 4,4-dihydroxyphenyl ether; 4,4-thiodiphenol; 4,4-dihydroxy-3,3-dichlorodiphenyl ether; 4,4-thiodiphenol; 4,4-dihydroxy-3,3-dichlorodiphenyl ether; 4,4-dihydroxy-2,5-dihydroxydiphenyl ether; BPI; 1,1-bis(4-hydroxyphenyl)-1-phenylethane; 1,1-bis(3-methyl-4-hydroxyphenyl)-1-phenylethane, and mixtures thereof. In one embodiment, the residues of dihydric phenol in the polycarbonate comprise 100 mol % of residues derived from BPA.

As the diester of carbonic acid, various compounds may be used, including, but not limited to diaryl carbonate compounds, dialkyl carbonate compounds and alkylaryl

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carbonate compounds. Suitable diesters of carbonic acid include, but are not limited to, diaryl carbonate; bis(4-t-butylphenyl)carbonate; bis(2,4-dichlorophenyl)carbonate; bis(2,4,6-trichlorophenyl)carbonate; bis(2-cyanophenyl)carbonate; bis(o-nitrophenyl)carbonate; ditolyl carbonate; m-cresol carbonate; dinaphthyl carbonate; bis(diaryl)carbonate; diethylcarbonate; dimethyl carbonate; dibutyl carbonate; dicyclohexyl carbonate; and mixtures thereof. Of these, diaryl carbonate is preferred. If two or more of these compound are utilized, it is preferable that one is diaryl carbonate. (note also applicants claim 10).

Note with regard to the melt volume rate note that FIG. 1 shows the schematic of a typical polycarbonate melt facility used in the production of the poly(carbonate-co-ester); and FIG.2 shows the comparative melt viscosity of copolymers in accordance with the reference and polycarbonate homopolymers lacking the polyester component.

With regard to applicants' claims 3 and 4 note that the reference discloses that polyfunctional compounds may be utilized. Suitable polyfunctional compounds used in the polymerization of branched polycarbonate include, but are not limited to, 1,1,1-tris(4-hydroxyphenyl)ethane, 4-[4-[1,1-bis(4-hydroxyphenyl)-ethyl]-dimethylbenzyl], trimellitic anhydride, trimellitic acid, or their acid chloride derivatives. Suitable endcapping agents include, but are not limited to phenol, p-tert-butylphenol; p-cumylphenol; p-cumylphenolcarbonate; undecanoic acid, lauric acid, stearic acid; phenyl chloroformate, t-butyl phenyl chloroformate, p-cumyl chloroformate, chroman chloroformate, hydrocardanol, nonyl phenol, octyl phenol; nonyl phenyl chloroformate or a mixture thereof. Furthermore, mixed carbonates and esters composed of endcappers from the list above along with phenol or alkylsalicylates are acceptable. Note also claims 7, 34, 55, 65 of the reference.

With regard to claims 5 and 6 note the reference discloses that the endcapping agent is preferably present in amounts of about 0.01 to about 0.20 moles, preferably

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about 0.02 to about 0.15 moles, even more preferably about 0.02 to about 0.10 moles per 1 mole of the dihydric phenol.

With regard to claims 7 and 8 as written, as noted in the rejection above, the presence of either the chloride, sulfate or phosphate or a combination of two or more may be zero.

With regard to claim 9, the reference discloses monomers DPC (25.30 g; 0.118 mol) and BPA (24.55 g; 0.107 mol) and the diacid polyester prepolymer (Prepolymer A, 1.08 g) were prereacted with a catalyst for 1 hour at 230.degree. C. 1 atm of nitrogen in a batch reactor tube. Tetramethylammonium hydroxide (TMAH) and NaOH served as catalysts and were added to the reaction mixture as an aqueous solution (100 .mu.L) in the molar ratios of 2.5×10^{-4} for TMAH and 1.5×10^{-6} or NaOH relative to BPA. after the prereaction, the polymerization reaction was conducted under increasing temperature and decreasing pressure as a function of time according to the following reaction profile in Table 2:

TABLE 2		
Time (min)	Temp. ($^{\circ}$ C.)	Pres. (mbar)
10	180	101.3
60	230	1.70
90	270	20
30	300	0.5-1.6

After the final reaction stage at 300 C. and 0.5 -1.6 mbar, butyl tosylate was added in a toluene solution as a quenching agent in a molar ratio of 6 times the molar concentration of NaOH. The copolymer product was purified by dissolving it in chloroform and followed by precipitation with methanol. The product was isolated by filtration and dried under vacuum at 50 C. Differential scanning calorimetry (DSC)

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indicated a glass transition temperature (T_g) of 133 C. The molecular weight M_w was determined to be 5.10×10^4 g/mol via gel permeation chromatography (GPC) using a 1 mg/ml polymer solution in methylene chloride versus polystyrene standards. The molar ratio of reactants for BPA, DPC and a diacid polyester prepolymer in this example is given by the following expression: $DPC = 1.08 \times (BPA + 2 \times \text{acid})$. Proton and carbon NMR of the purified polymer confirmed that the polyester prepolymer was chemically incorporated and that the structure was that of a block copolymer and that there was less than 1.3% by weight of unincorporated polyester prepolymer.

With regard to claim 11, as noted above the reference discloses suitable dihydric phenols of the reference include, but are not limited to, BPA; 2,2-bis(3,5-dibromo-4-hydroxyphenyl)propane; 2,2-bis(3,5-dimethyl-4-hydroxyphenyl)propane; 1,1-bis(4-hydroxyphenyl)cyclohexane; 1,1-bis(3,5-dimethyl-4-hydroxyphenyl)cyclohexane; 1,1-bis(4-hydroxyphenyl)decane; 1,1-bis(4-hydroxyphenyl)propane; 1,1-bis(4-hydroxyphenyl)cyclodecane; 1,1-bis(3,5-dimethyl-4-hydroxyphenyl)cyclododecane; 4,4-dihydroxyphenyl ether; 4,4-thiodiphenol; 4,4-dihydroxy-3,3-dichlorodiphenyl ether; 4,4-thiodiphenol; 4,4-dihydroxy-3,3-dichlorodiphenyl ether; 4,4-dihydroxy-2,5-dihydroxydiphenyl ether; BPI; 1,1-bis(4-hydroxyphenyl)-1-phenylethane; 1,1-bis(3-methyl-4-hydroxyphenyl)-1-phenylethane, *and mixtures thereof*.

With regard to claims 12 note example 1 and table 2 discloses a catalysts, temperature of about 180 to 300 C and from 0.5 to 1013 mbar which overlaps applicants' claimed invention.

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With regard to applicants claim 25, note that the copolymer product was quenched, purified and analyzed as detailed in Example 1.

With regard to applicants' claim 26 note although minimal devolatilizing occurs it is in fact disclosed therein. Note examples 1-6.

With regard to applicants' claims 15, 17, 18, 19, and 27 note examples 1-6.

With regard to applicants' claim 16, note that according to applicants' recited claim 1 the ionic species may or may not be zero and thus not be present.

Thus the reference discloses a polycarbonate prepared from the same components as claimed by applicants. Thus in view of the above, there appears to be no significant difference between the reference and that which is claimed by applicant(s). Any differences not specifically mentioned appear to be conventional. Consequently, the claimed invention cannot be deemed as novel and accordingly is unpatentable.

35 USC 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 24 is rejected under 35 U.S.C. 103(a) as being unpatentable over USP 6486294 in view of US 6271290.

With regard to applicants' claim 24, the reference **USP 6486294** discloses a

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polycarbonate prepared from the same components as claimed by applicants except for the particular sulfur containing quenching agent. **US 6271290** provides a method for making a polycarbonate composition wherein the polycarbonate is prepared by melt synthesis using a sulfur-containing acid compound to at least partially quench the melt catalyst. It would have been obvious to one having ordinary skill in the art at the time the invention was made to employ the particularly disclosed sulfur-containing quenching agent to partially quench the melt catalyst since such method is disclosed as being an effective and inexpensive means.

Claims 13-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over USP 6486294 in view of US 6608165 see abstract, cols. 1-4, claims 1-4.

With regard to claim s 13 and 14 note the reference discloses a polycarbonate prepared from the same components as claimed by applicants except for the particular metal(s) based on the total weight of the aromatic dihydroxy compound. However, **US 6608165** discloses a an aromatic polycarbonate and a production process therefor. More specifically, it relates to a process for producing an aromatic polycarbonate from an aromatic dihydroxy compound and a carbonic acid diester, both having a low content of an aldehyde compound, by an ester exchange method and to an aromatic polycarbonate. The reference discloses the use of a nitrogen- containing basic compound or phosphorus-containing basic compound in such an amount that it does not exceed 20 times Fe: the total content of iron contained in the dihydroxy compound and the carbonic acid diester as raw materials which is particularly effective. The amount is particularly preferably such that it does not exceed 20 times Fe*)+150. having excellent color and stability obtained by the above process. Thus, it would

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have been obvious to one having ordinary skill in the art at the time the invention was made since it has been found that such an amount improves the color of the obtained.

Claims 21, 22, 23 are rejected under 35 U.S.C. 103(a) as being unpatentable **over** **USP 6486294** in view of **US 6509435** see abstract, cols. 1-4 and examples.

With regard to applicants' claims 21-23, the reference **USP 6486294** discloses a polycarbonate prepared from the same components as claimed by applicants except for the particular catalyst system as claimed.

However, **US 6509435** discloses a method for preparing an aromatic polycarbonate, which comprises polycondensing an aromatic dihydroxy compound comprising mainly bisphenol A and a carbonic acid diester in the presence of, as an ester exchange catalyst comprising:

an alkali metal compound and a nitrogen-containing basic compound and/or a phosphorus-containing basic compound and, as a co-catalyst, a sulfur-containing compound, the alkali metal compound being used in an amount of 1×10^{-7} to 1×10^{-5} equivalent in terms of alkali metal atoms and the nitrogen-containing basic compound and/or the phosphorus-containing basic compound being used in a total amount of 5×10^{-5} to 1×10^{-3} equivalent in terms of nitrogen atoms and/or phosphorus atoms based on 1 mol of the aromatic dihydroxy compound, and the sulfur-containing compound being used in an amount of 0.1 to 100 atoms in terms of sulfur atoms based on 1 atom of the alkali metal of the alkali metal compound,

so as to form the aromatic polycarbonate of claim 1 of the reference above.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to employ the particularly claimed catalyst as disclosed by applicants; in claims 21-23 in view of the disclosure in **US 6509435** since such catalyst system provides for a polycarbonate having melt molding without adding a heat resistant stabilizer and suitable for the melt molding of a thin product, production method and molded products thereof.

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

Correspondence

Please note that the cited U.S. patents and patent application publications are available for download via the Office's PAIR. As an alternate source, all U.S. patents and patent application publications are available on the USPTO web site (www.uspto.gov), from the Office of Public Records and from commercial

sources. Applicants may be referred to the Electronic Business Center (EBC) at <http://www.uspto.gov/ebc/index.html> or 1-866-217-9197.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Examiner Terressa Boykin whose telephone number is


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571 272-1069. The examiner can normally be reached on Monday through Friday from 6:30am to 3:00pm.

The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306. The general information number for listings of personnel is (**571-272-1700**).

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

tmb


Examiner Terressa Boykin
Primary Examiner
Art Unit 1711